RESEARCH ARTICLE

Response of Grain Yield of New Bread Wheat (*Triticum aestivum* L.) Cultivars to Sowing Date Based on Agro-Climatic Indices Under Gorgan Environmental Conditions

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ABSTRACT

Soughi, H., Khodarahmi, M., Bagherikia, S., and Nazari, M. 2020. Response of grain yield of new bread wheat (*Triticum aestivum* L.) cultivars to sowing date based on agro-climatic indices under Gorgan environmental conditions**. Seed and Plant Journal 36:1-31. (in Persian).**

To study the response of grain yield of commercial bread wheat cultivars to different sowing dates based on agro-climatic indices, a field experiment was carried-out in Gorgan agricultural research station, Gorgan, Iran, in 2017-18 and 2018-19 cropping cycles. . The experimental design was split plot arrangements in randomized complete block design with four replications. Five sowing dates; 01 November, 16 November, 01 December, 16 December and 31 December were assigned to main plots, and four spring wheat cultivars; Ehsan, Tirgan, Meraj and Kalateh were randomized in subplots. The results showed that grain yield and number of spike per square meter were not significantly different in two cropping cycles. The highest grain yield (6157.9 kg ha-1) was obtained in the third sowing date, however, the grain filling period was not affected (42.37 and 42.21 days, respectively) despite one-month difference, with the first sowing date. It implies that the third sowing date (16 December) provided favorable conditions for crop growth and no lodging was observed in different cultivars. In the third sowing date, optimal conditions; temperature, day length, relative humidity and energy use efficiency during grain filling period were established for different wheat cultivars, therefore, the highest values were obtained for agro-climatic indices; growing degree days (GDD), day length (DL), photo-thermal units (PTU), hydro-thermal units (HYTU) and energy use efficiency. Kalateh and Tirgan cultivars had the highest grain yield, respectively, and their grain yields were significantly greater than Ehsan and Meraj cultivars. Also, the number of spike per square meter was significantly greater in these two cultivars. The growth period in cv. Kalateh was shorter than the other cultivars, no difference in duration of grain filling period, which caused the plant to escape terminal heat and drought stresses, increasing energy use efficiency and consequently increasing grain yield. According to the results of this study, suitable sowing date and adapted cultivar played key roles in managing grain filling period and increasing grain yield.

Keywords: Grain yield, energy use efficiency, grian filling period, anthesis, northern warm and humid agro-climatic zone

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RESEARCH ARTICLE

Field Evaluation of Promising Local Apple Genotypes for Tolerance to Fungal Canker

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ABSTRACT

Dastjerdi, R., Nadi, S., and Damyar, S. 2020. Field Evaluation of promising local apple genotypes for tolerance to fungal canker**. Seed and Plant Journal 36: 33-50. (in Persian).**

Through this investigation 18 promising local apple genotypes along with Gala, Fuji, Red Delicious and Golden Delicious cultivars were evaluated for tolerance to fungal cankers in Kamalshahr horticultural research station, Karaj, Iran, during 2015 and 2016 growing seasons. Preliminary field assessment confirmed the presence of *Cytospora*. and *Neofusicoccum* in infected trees. The results showed that the relative susceptibility of genotypes to cytospora chanker was different. H1-SH and T51 genotypes with the average infection score of three were identified as susceptible, B-K-KH together with Fuji cultivar were moderately-susceptible, and SBA genotype and cv. Golden Delicious were identified as low susceptible. Artificial inoculation of *Neofusicoccum* isolates on dormant excised apple twigs confirmed the pathogenicity of isolates and showed different responses of genotypes to pathogen. Under field conditions, the infection score for sooty canker ranged from zero to three (in MD-N2 genotype). GO-N3, ME6, B-K-KH and SBA genotypes as well as cv. Fuji, cv. Red Delicious and cv. Golden Delicious were grouped as moderately susceptible. Simultaneous infection to both fungal cankers observed on five promising genotypes; T51, SBA, S-O-G, H1-SH and B-K-KH, as well as cv. Golden Delicious and cv. Fuji. It can be concluded that there are invaluable resistance sources among promising local apple genotypes, under natural infection, to be selected and used in apple breeding programs.

Key Words: Apple, germplasm, cytospora canker, sooty cankers, moderately susceptible.

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RESEARCH ARTICLE

Genotype × Environment Interaction and Grain and Forage Yield Stability of Promising Lines of Dual-Purpose Sorghum

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ABSTRACT

Khazaei, A.. Shiri, M. R, Torabi, M., Ghasemi, A., Beheshti, A. R., and Azari Nasrabad, A. 2020. Genotype × Environment interaction and grain and forage yield stability of promising lines of dual-purpose sorghum**. Seed and Plant Journal 36: 51-70. (in Persian).**

To evaluate the interaction pattern of genotype × environment and grain and dry forage yield stability of 10 promising dual purpose sorghum lines, a field experiment was carried out using randomized complete block design with four replications in six field stations of Karaj, Mashhad, Birjand, Zabol, Moghan and Isfahan in 2014 and 2015 growing seasons. Combined analysis of variance showed that the main effects of year, location, and genotypes as well as their interaction effects were significant ($p < 0.01$) on grain yield, dry forage yield and biological yield. Mean comparison showed that line No. 3 (KDFGS9) with grain yield of 7.8 tha^{-1} had the highest grain yield, and line No. 1 (KDFGS4) and line number 9 (KDFGS26) with 26.2 and 26.1 tha^{-1} had the highest dry forage yield, respectively. Line No. 1 (KDFGS4), No. 2 (KDFGS6) and No. 9 (KDFGS26) were superior to the others by producing of 34.3, 33 and 32.5 tha^{-1} of biological yield, respectively. Analysis of variance by AMMI model and fitting of main components to the genotype by environment interaction effect showed that two main components for grain yield, dry forage yield and biological yield were significant. The first two components explained 67.8 percent of the sum of the squares of the interaction. According to the AMMI model and ASV stability parameter, lines No. 2 (KDFGS6) and No. 3 (KDFGS9) with high grain and dry forage yield stability were the most suitable lines for dual purpose with the priority of grain production. On the other hand, lines No. 9 (KDFGS26) and No. 1 (KDFGS4) can be released as dual-purpose cultivars with the priority of forage production.

Keywords: Sorghum, AMMI model, AMMI stability value, dry forage yield, biological yield,

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RESEARCH ARTICLE

Effect of Planting Arrangement on Forage Yield, Protein Content and Some Morpho-Physiological Characteristics of Forage Amaranth (*Amaranthus hypocondriacus*) Under Gorgan Environmental Conditions

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ABSTRACT

Feyzbakhsh, M. T., Mokhtarpour, H., Rahnema, A. A., Safaei, A. R. 2020. Effect of planting arrangement on forage yield, protein content and some morpho-physiological characteristics of forage amaranth (*Amaranthus hypocondriacus*) under Gorgan environmental conditions**. Seed and Plant Journal 36: 71-85. (in Persian).**

Increasing yield in field crops requires identification of appropriate management practices including suitable planting arrangement. A field experiment was carried out to determine the effect of planting arrangement on forage yield, protein content and some phsio-morphological traits of forage amaranth at Gorgan agriculture research station, Gorgan, Iran, in 2017-2018 growing seasons. The experimental design was factorial arrangements in randomized complete block design with three replications. The first factor was the row spacing at three levels (30, 45 and 60 centimeter), and the second factor was inter plant spacing at six levels (5, 10, 15, 20, 25 and 30 centimeter). The results showed that the effect of inter plant spacing and the interaction effects of row spacing × inter plant spacing were significant on all studied traits. The effect of row spacing on all traits, except leaf to stem ratio, was significant. Considering the significant interaction effects, slicing of interaction effects was performed to determine the best inter plant spacing for each row spacing. In suitable combinations; 30 × 5, 30 × 10, 45 × 10 and 60 × 5 centimeters planting arrangement, higher protein yield and dry forage yield of 896-956 $Kg.ha^{-1}$ and 7.7-8.05 $ton.ha^{-1}$ were obtained, respectively. In summary, for achieving higher forage yield, if the row spacing is 30 cm the inter plant spacing should be 5-10 centimeters (plant density 66.6 and 33.3 plant m^{-2}, respectively). Given the row spacing is 45 and 60 cm, then the inter plant spacing should be five centimeters (plant density 44.4 and 33.3 plant m^{-2}, respectively). The results of this experiment showed that the appropriate planting arrangements for amaranth in Gorgan environmental conditions are 30 × 5, 30 × 10, 45 × 10 and 60 × 5 centimeter.

Keywords: Amaranth, fresh forage, leaf: stem ratio, plant density, stem diameter.

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RESEARCH ARTICLE

Assessment of Possibility of Autumn Sowing of Sugar Beet in Alborz Province in Iran

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ABSTRACT

Hosseinzadeh Fazl, M., Taleghani, D. F., Habibi, D., Sadeghzadeh Hemayati, S., and Ardakani, M. R. 2020. Assessment of possibility of autumn sowing of sugar beet in Alborz province in Iran**. Seed and Plant Journal 36: 87-104. (in Persian).**

Sugar beet is usually planted in spring in Alborz province and similar climatic conditions, and uses high irrigation water and suffers from the breakout of pests and diseases. The development of sugar beets cultivars for autumn sowing has become of interest of breeders due mainly to its much lower irrigation water requirement than spring sown sugar beet. The present research was aimed to explore the possibility of autumn sowing of sugar beet in Karaj and similar climatic conditions. Two sugar beet cultivars; Sharif (moderately resistant) and Vico (resistant), and three sowing dates; early-October, late-October and mid-November were evaluated as factorial arrangements in randomized complete block design with three replications at sugar beet research station, Karaj, Iran, in three growing seasons from 2014 to 2017. Most seedlings were killed by winter freezing in 2014 and 2016, however, sugar beet seedlings survived in 2015 winter and produced economic yield. Analysis of variance of data for the 2015-16 growing season showed that when sowing date delayed from early-October to late-October and mid-November, the bolting rate significantly decreased from 15.9% to 5.0% and 0.5%, respectively. However, the winter killing rate increased from 48.7% in early-October to 62.6% and 78.8% in the second and third sowing dates, respectively. Sowing date significantly ($p < 0.01$) affected root, sugar and white sugar yields. The highest root, sugar and white sugar yields (41.6, 6.5 and 4.3 tha^{-1}, respectively) were produced in early-October, and the lowest were obtained from late-October and mid-November sowing dates. Cultivars did not differ significantly for root yield, but were significantly ($p < 0.05$) different for sugar and white sugar yield. The sugar and white sugar yield of cv. Vico (4.2 and 2.9 tha^{-1}, respectively) was higher than cv. Sharif (3.4 and 2.2 tha^{-1}, respectively). Cv. Sharif' was more sensitive to delay in sowing date. In conclusion, considering limitation of water resources in Iran, the development of resistant cultivars to bolting and freezing may facilitate autumn sowing of sugar beet in Karaj and similar climatic conditions.

Keywords: Sugar beet, bolting, root yield, freezing damage, sugar yield.

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RESEARCH ARTICLE

Effect of Vegetative Rootstock on Growth and Fruit Characteristics of Peach and Nectarine Cultivars Under Environmental Conditions of Golestan Province of Iran

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ABSTRACT

Ghazaeian, M., Bouzari, N., Zamani, S. 2020. Effect of vegetative rootstocks effect on growth and fruit characteristics of peach and nectarine cultivars under environmental conditions of Golestan province of Iran. **Seed and Plant Journal 36:105-122. (in Persian).**

To assess the vegetative rootstock effect on some vegetative and reproductive characteristics of peach and nectarine commercial cultivars, a study was conducted in Golestan agricultural and natural resources research center, Iran, from 2012 to 2017. Six commercial cultivars; Kuota, Independence, J. H. Hale, Dexired, Redtop and Redgold, were grafted on Penta, Tetra and GF677 rootstocks. The greatest fruit yield efficiency was observed in Dexired and Independence on Penta, and the least in Redtop on GF677. The highest fruit yield per tree was obtained from J. H. Hale on GF677, and the lowest belonged to Independence on Penta. Also, the amount of total soluble solids (TSS) was significantly affected by rootstock and cultivar, and was the highest in cv. Redtop on the Penta. The lowes TSS, however, was measured in cv. Redtop on the GF677. The highest fruit acidity (pH) was in J. H. Hale on GF677. The effect of rootstock on the TCSA (tree cross sectional area) was significant, and the greatest was measured for cv. Redtop on GF677, and the least belonged to Redgold and J. H. Hale on GF677. The TCSA was the highest in GF677 and lowest in Penta. The largest canopy developed in cv. Redtop on GF677.

Key words: Peach, nectarine, stone fruit, adaptability, tree vigor, fruit yield.

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RESEARCH SHORT ARTICLE

Reaction of Irrigated Wheat Commercial Cultivars and Candidate Lines of Iran to Bacterial Leaf Streak Disease

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ABSTRACT

Malihipour, A., Nabati, E., and Nasrollahi, M. 2020. Reaction of irrigated wheat commercial cultivars and candidate lines of Iran to bacterial leaf streak disease. **Seed and Plant Journal 36:123-128. (in Persian).**

Bacterial leaf streak of wheat caused by *Xanthomonas translucens* pv. *undulosa* is one of the most important diseases of wheat which has threatened wheat production in some regions in Iran in recent years. Considering the importance of the disease in the country and lack of information about reaction of wheat cultivars and candidate lines of Iran to the disease, the reaction of 113 wheat commercial cultivars and candidate lines from the national irrigated wheat breeding programs of Iran were evaluated under high natural disease pressure at agricultural research station of Boroujerd, Lorestan, Iran, in 2017-18 cropping cycle. The results showed that all wheat commercial cultivars and candidate lines were susceptible to the disease with scores varied from 71 to 99 based on a 00-99 scale. Ten commercial cultivars including Parsi, Setareh, Meraj, Kalateh, Tirgan, Ehsan, Gonbad, Morvarid, Darya, and Narin, and six candidate lines including M-93-11, S-94-7, S-94-12, S-94-22, N-94-8, and MS-93-3 were rated highly susceptible with scores from 94 to 99. The present study, which is the latest and most recent evaluation on the reaction of wheat to bacterial leaf streak in Iran, may open a window for further research and development of resistan wheat cultivars to the disease.

Keywords: Wheat, genotype × environment interaction, *Xanthomonas translucens* pv. *undulosa*, resistance, susceptible.

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RESEARCH SHORT ARTICLE

Effect of Grafting Method on In Vitro Micrografting Success of Some Sweet Cherry Cultivars

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ABSTRACT

Naddaf, M. E., Ganji Moghaddam, E., Rabiei, Gh., and Mohammad Khani, A. 2020. Effect of grafting method on in vitro micrografting success of some sweet cherry cultivars**. Seed and Plant Journal 36: 129-135. (in Persian).**

This study was carried out to optimize the micrografting method in sweet cherry using factorial arrangements in completely randomized design with five replications. Experimental factors included; seven ceherry cultivars; Zard, Siah-e-Mashhad, Dovomras, Bing, Pishras, Takdaneh, Hajyousefi, and four grafting methods; wedge grafting without cover (G1C1), cleft grafting without cover (G2C1), wedge grafting with cover (G1C2), cleft grafting with cover (G2C2). Micrografting with micro-scion was performed and leafy primordia from sweet cherry cultivars grown on Rootstock of “Gisela 6” in vitro conditions. The micrografted plants were cultured on MS medium with 1 mgl^{-1} BAP, and after three weeks successful micrografted plants in the MS medium were transferred to a pot of perlite-peat moss (1: 1) for acclimation. There was significant difference among cultivars only for shoot length index. The main effect of grafting method and the interaction effect of cultivars × grafting method were significant on all indices, except on the micrografting success rates. In all sweet cherry cultivars, G2C2 grafting method had the highest successful grafting rate (42.9%), number of leaves (4.2 leaves), shoot growth (6.5 cm), and the shortest grafting time (2.2 days). Among the sweet cherry cultivars; cv. “Hajyousefi” had successful grafting rate (36.9%), cv. Siah-e Mashhad had the shortest grafting time (3 days), and cv. Zard had the highest number of leaves (3.3 leaves), and cv. Dovomras had the greatest shoot growth (5.4 cm).

Keywords: Sweet cherry, acclimation, leafy primordia, shoot tips, tissue culture.

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